Calculus I 复习专题三 第五和八章 积分知识点一: 积分的定义.
$$1.(2022年期末) \text{ Evaluate the following limits: } \lim_{n\to\infty} \sum_{k=1}^{n} \frac{k}{n^2} \sin^2(1+\frac{k}{n}).$$

$$2.(2021年期末) \lim_{n\to\infty} \frac{1}{n} (\sqrt{1+\cos\frac{\pi}{n}} + \sqrt{1+\cos\frac{2\pi}{n}} + \cdots + \sqrt{1+\cos\frac{n\pi}{n}}) = ().$$

$$3.(2020年期末) \text{ Evaluate the following limits.}$$

 $\lim_{n\to +\infty} (\frac{n}{2n^2+3n+1^2} + \frac{n}{2n^2+6n+2^2} + \cdots + \frac{n}{2n^2+3nk+k^2} + \cdots + \frac{n}{2n^2+3n^2+n^2}).$ 知识点二: 积分的性质(填空选择题).

4.(2022年期末) If $\int_0^1 \frac{e^x}{x+1} dx = a$, then $\int_0^1 \frac{e^x}{(x+1)^2} dx = ($).

(A) 8.

(A)
$$\int_0^a (f(x)+f(-x)) dx$$
 (B) $\int_0^a (f(x)-f(-x)) dx$ (C) 0

7.(2020年期末) If f(x) is continuous on $(-\infty,\infty)$, which of the following statements is wrong?

(A)
$$\int_0^1 f(x) dx = \int_0^1 f(t) dt$$
.
(B) $\int_0^1 f(x) dx = \int_0^1 f(\sin x) d(\sin x)$.
(C) $d(\int_0^x f(t) dt) = f(x) dx$.
(D) $d(\int_0^x f(t) dt) = f(x^2) d(x^2)$.

C)
$$d(\int_0^x f(t) dt) = f(x) dx$$
. (D) $d(\int_0^{x^2} f(t) dt) = f(x^2) d(x^2)$.

8.(2019年期末) Let f(x) be a centinuous function, and a is a nonzero constant. Which of the following function is an odd function?

(A)
$$\int_{a}^{x} (\int_{0}^{u} t f(t^{2}) dt) du$$
. (B) $\int_{0}^{x} (\int_{a}^{u} f(t^{3}) dt) du$.

(C)
$$\int_0^x (\int_a^u t f(t^2) dt) du$$
. (D) $\int_a^x (\int_0^u (f(t))^2 dt) du$.

9.(2021年期末) The average value for
$$f(x) = \cos^4 x$$
 on $[0, \pi]$ is ().

$$10.(2020$$
年期末) The average value for $f(x) = \sin^3 x$ on $[0, \pi]$ is ().

11.(2021年期末) Using Simpson's Rule with n=4 to estimate $\int_2^4 \frac{1}{x^{-1}} dx$, the approximation is ().

知识点三: 积分的计算,

12.(2022年期末) Evaluate the integrals. (1) $\int x \tan^2 x \, dx$.

(1)
$$\int x \tan^2 x \, dx$$
.

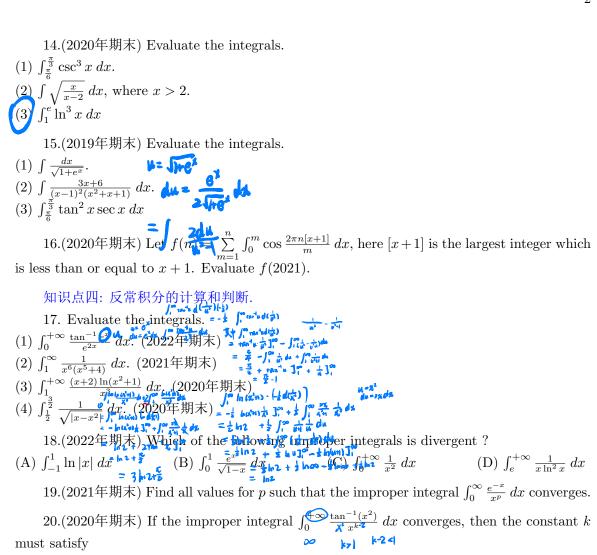
(2)
$$\int_{1}^{\sqrt{3}} \frac{d}{x(1+x^2)^2} dx$$
.

(3)
$$\int \frac{\ln(1-x^2)}{x^2\sqrt{1-x^2}} dx$$

$$13.(2021$$
年期末) Evaluate the integrals. (1) $\int_{\frac{1}{e}}^{e} \frac{\ln^2 x}{e} dx$

(2)
$$\int_{1}^{\sqrt{2}} \frac{1}{x^3 \sqrt{x^2 - 1}} dx$$

(3)
$$\int \frac{1}{(1+x+x^2)^2} dx$$



(B) k > 3. (C) 1 < k < 2. (D) 1 < k < 3.

must satisfy

(A) k < 1.